



Anthroposophic News Sheet

PUBLISHED BY THE GENERAL ANTHROPOSOPHIC SOCIETY, DORNACH, SWITZERLAND
FOR MEMBERS ONLY

4th of May 1941.

No. 17/18

9th year.

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Yearly subscription: 17.— Swiss Francs. - Single Copies: 35 cents.

THE SO-CALLED DANGERS OF INITIATION.

Lecture by Dr. RUDOLF STEINER, delivered on the
19th of December 1907. *)

What is known as spiritual science - we investigated its sources yesterday **) - is encountering on the part of our contemporaries, on the one hand the reproach of being something fantastic and dreamlike (apart from more serious reproaches), and on the other hand a reproach that follows quite a definite direction, and this we shall examine to-day. We know that when we speak of initiation, certain dangers are also mentioned in connection with spiritual science. But as a rule, those who speak of these dangers have very dim and hazy ideas regarding such dangers. This must be so, for most people have hardly any idea whatever of the content, the task and the mission of spiritual science in our present time.

If we wish to throw light upon these dangers, we must distinguish first of all the fear which our contemporaries feel when spiritual science in general is given out; this must be distinguished from the dangers that really exist to some extent in spiritual science, dangers that confront those who wish to enter the higher worlds and who seek to attain knowledge in the invisible, super-sensible world. It is then that men say it is dangerous to speak of such things, to propagate such teachings and to turn the heads of people.

Let me mention at once a reproach that is always being made against spiritual science, arising out of a completely erroneous conception and which remains entirely on the surface of things; this is that the interest in spiritual science estranges man from life. People say that spiritual science leads man into a life estranged from the world, far away from the world, so that he loses his interest in real life and his sympathy for it.

We see in many families how one or another of their members approach spiritual science, because they hope to find in it

*) From stenographic notes unrevised by the lecturer. **) Lecture on Initiation, 18th of December 1907.

that satisfaction to heart and soul that their former life could not give, and then friends and relatives say: Spiritual science has taken them away from us - It is dangerous if these people begin to lead an ascetic life estranged from the world, for then their relatives say that spiritual science led them into this life. But great intolerance lies behind such statements. For the people who advance them think that only their own way of living is justified, and if someone does not lead exactly the same life, they say that it is asceticism; if someone does not exactly share their own ideas and views on life, they look upon him as an ascetic. But if we observe people's lives, for instance, what a husband and wife do from morning to night (here I do not mean those who really stand in the midst of practical life), if we see how the life of so many people is limited to suppers and dinners and other trivial pleasures, it is easy to understand that those who seek something higher cannot share this kind of life. And if a man withdraws from such a life, people say that he has fallen a prey to asceticism, that he has become totally estranged from life and that his mind is occupied with all kinds of abstract confused ideas. Such people cannot conceive that it would be the greatest renunciation on the part of such a man if he were to live as they do. One who has learned to know the sources of the living realities that are round about us, would have to chastise himself if he were obliged to share in the existence which these people call life - for him, it would be real asceticism. Not because he has grown estranged from life, but because he knows life in its true form, he refrains from the penance of participating in their manner of living.

Of course, these people believe that anyone who occupies himself with such mad ideas is giving up something. But they are making a mistake, for he does not give up anything. So long as a man enjoys such trivial doings, a higher tenor of life will not suit him. The essential point is not that his life must change, but that his feelings and sensations must undergo a change. He must know that real life only flows from the higher sources of existence and that it can only be found there.

Many a family sees one of its members hastening to follow the way of life of those who strive after spiritual science. And it will be said: Spiritual science has taken him away from us. But is this true? - Those who can look into men's souls will find that this is not true. This very member of the family, who finds spiritual science, first began to be repelled by what went on in his environment. And then he somehow heard of spiritual science and found in it the very thing he so much missed in his own circles. Is it therefore right to say that spiritual science drove him away from them? Spiritual science gave him what they could not give him. Thirsting souls that seek a true life-content and are unable to find it in the environment in which life has placed them, go in search of it where they can find it. Such souls were driven away by their own environment, nevertheless people say that they were taken away from it! Spiritual science is not an agitator; there would be no anthroposophical movement without such men who feel repelled by the present manner of

life and attracted by what the other side can offer them.

Of course, the possibility of a certain danger arises when people are not mature enough for spiritual science; then they are literally blinded and crushed by what they encounter in it. One should not forget that the foundation of spiritual science is a logical and strict mode of thinking, a soundly constructed logic; it investigates step by step the structure of the world's edifice. But in our ordinary life there is not much logic, no matter how much one may boast of its brilliant successes! Even where advice is sought regarding life problems in popular science and other specialised branches of science, we only find a narrow-compassed logic. When those who are accustomed to a strict way of thinking and who investigate scientific results are obliged to follow the trend of thought ordinarily propagated by modern science, they will actually experience physical pain through the coarse, brutal conclusions arrived at. Though we must admire what science has discovered with the aid of its instruments and methods, the content of its thoughts is generally tremendously limited. And so it comes about that, as a rule, those who lead an ordinary life are not trained and practised in a real, logical way of thinking.

Generally one under-estimates the significance of a man's conflict with spiritual science, a conflict which takes place in the soul accustomed to follow the dull reasoning of to-day when it encounters the penetrating trains of thought in spiritual science. A man of sensitive soul and feeling heart, feels that real nourishment flows towards him in spiritual science and that something wonderful shines out of it. And when he begins to note that his ordinary thoughts are unable to penetrate into the higher worlds, this has a crushing, sickening influence upon his soul, which even reaches his nervous system. This may particularly be the case if he can only seek the refuge of spiritual science in rare holiday-moments, if he can only take a few crumbs, and must then return to his ordinary life. He will in that case feel the unhealthy contrast; and this is the cause of the discontented, diseased souls whom we meet with to-day in such great numbers, souls that have grown dissatisfied after having come into contact with the spiritual-scientific teachings.

We may even go further. Those who can interpret the signs of our time, see before them a discouraging picture for the future. To-day humanity lives to a great extent in darkness and in chaos; it judges life without knowing the forces which drive it along, forces which have arisen solely as a result of the prevailing human mentality. Those who believe that disposition and opinion cannot influence life, do not know that thoughts are real facts. Thoughts HAVE an influence upon life and even affect a nation's health. Those who know that materialism predominated in the innermost depths of humanity through that long time when great problems of our age had to be solved, also know that materialism called into life something that is judged wrongly on many sides.

People admire many an author of brilliant analyses of

life in its most varied forms; yet they are not aware that what is written and spoken by such men is but empty words. In many cases an expert might be able to show what lies behind such brilliant cleverness. Sometimes one may really find behind it something that we may call feeble-mindedness. To-day it is possible to have a feeble mind and nevertheless to write brilliant books.

Some decades ago, it was said by someone that to-day it is no great feat to write beautiful long poems, for our language has reached the point of thinking for us. The general education of to-day is of such a kind that a man who has perhaps occupied himself since his sixteenth year with taking in all the judgments that whirr through the air, is able to write brilliantly, but is nevertheless feeble-minded. This is an apparently paradoxical statement, but it is objectively true. It should just be regarded as a symptom of the superficial way in which men live to-day; it should show us how weak are the powers of judgment that can really penetrate into the depths of things, and how little able they are to grasp the forces behind real life. Yet such people are the leaders!

And how do matters stand with those who are led by them? - If we judge the spiritual mentality of those who are experiencing in so many different ways this collision with what spiritual science can offer, we must say: Had they remained in the sphere of their habitual life, they might perhaps have become passably clever people; but they encountered spiritual science, and this is like a powerful light shining into a room containing much uncleanness. While it was dark, this uncleanness could not be seen. But when the knowledge of life's true sources shines into the darkness, the contrast between the old and the new condition brings it about that a man who would perhaps have remained a prosaic, fairly reasonable person cannot bear the light of knowledge and now becomes completely unhinged. Here lies a danger! But can we say that it is the fault of spiritual science? - Is it not rather the materialistic direction of the spirit that brings man into this condition? - And should spiritual science refrain from bringing mankind that light, just because there are such dangers? - Though one or another may suffer, it is not possible to deny humanity what it must receive for its welfare and its real progress.

But real dangers exist for those who seek access to the higher worlds. Unfortunately we can read more than enough about them in many a theosophical book, where they are described in far too dark a colour. We do not wish to embellish anything, but let us observe quietly and objectively how matters stand with these dangers.

A special difficulty arises just on the threshold, because there, great illusions and hallucinations must be distinguished in connection with reality and truth. The most difficult thing of all is to overcome certain preconceptions and prejudices

which we bring with us from ordinary life. When people hear that there is a path leading into the higher worlds, they are frequently seized by a tremendous greed and passion; they consider it unnecessary to follow strictly what I specially emphasized in yesterday's lecture, namely, the strict training of thought, feeling and will. But such men must be told that this is an absolute requirement to-day, just as a thousand years ago it was a requirement which had to be observed by all occult teachers.

In the past, those who were unwilling to develop a thinking no longer dependent on the senses, were not admitted to an occult schooling. This cannot be observed so strictly to-day, for those who were the guardians of knowledge, at that time gave man no opportunity whatever of attaining this knowledge unless he fulfilled the necessary requirements.

Now it is otherwise. Knowledge is now streaming out to man through thousands and thousands of channels. Yet it is amazing to see that even great men in the sphere of science have not the slightest idea of this primordial wisdom of humanity. The unriddling of the world's riddle - this is what man cannot learn through science.

Problems often arise only when we approach science. Questions arise which already existed in primeval times, and men would be languishing for an answer were it not supplied by spiritual science. A genuine guide of truth cannot, for instance, lay aside Haeckel's "Riddles of the World" without feeling that Haeckel not only failed to solve riddles, but that he even advanced new ones. Questions are asked which did not exist in primeval times. Modern science asks questions far more than answering them. Spiritual science has not been founded arbitrarily, but out of the deepest knowledge of the needs of humanity, which will more and more require what spiritual knowledge alone can give. Humanity cannot do without it.

Many people think that the materialistic conceptions of our environing world can satisfy them. They say: I find in them an explanation for everything; I do not need anything from spiritual worlds. Yet there is something in man which cannot say this for long. Over and over again, the soul's deepest desire and longing will deny and reject such an intellectual comprehension of the world surrounding us.

This longing of the soul cannot be allayed. It grows, it renders man weak and ill and he becomes unable to do his work in life. Many souls to-day have gone astray and seek something; yet they reject what they seek and if the soul's longing is not satisfied by spiritual science doubt, hopelessness and even despair may enter. Therefore spiritual science had to be proclaimed to the world; this was a necessity of our time.

And there we often see that a ravenous desire takes possession of a man, while he shuns the great effort entailed by the preparation; he is too lazy. He says: "Let me lift up my soul. Let me float along in bliss! What you offer me through spiritual science

is merely something that is clothed in ideas and thoughts! I do not want the spirit, I want the soul! " - If only people would realise that what they foster in themselves only makes them become their own bitterest enemies! Only the quiet, gradual progress in knowledge can satisfy their soul's longing; it can only be satisfied by calmly surrendering to these truths. And so there are many souls to-day of whom we may speak as souls who have gone astray in the world, but who really confront themselves as their own enemies.

And there are others who bear within them the longing for a higher knowledge; yet they do not wish to abandon their ordinary logic. They cannot enter the higher worlds. We come across diseased souls in ever greater numbers. They spin out fancies concerning all kinds of thoughts which belong to spiritual science; and then spiritual science is blamed for their diseased condition, whereas it is really the materialistic mentality which is responsible for it. Their illness merely rises to the surface, is conjured up, as it were, by their final collision with spiritual science.

We may make great resolutions to penetrate more earnestly into the higher spheres of life, but we soon begin to flag, particularly when a real test has to be faced for the first time. This test is that upon the threshold dangers must be perceived surrounding life on every side, and which we did not see before. A man may live in the neighbourhood of a factory of explosives and may dwell in his house for many years contentedly and peacefully, until one day he hears about the factory and then begins to tremble for his safety every moment. He does not realise that the perception of a danger should be no reason to fear it. Nothing has changed externally, only his own knowledge in regard to his external environment.

It is the same when we approach the supersensible worlds. This world contains the sources of bliss and lofty experiences which cannot be compared with anything that we experience in the physical world. But it also contains powerful enemies of human nature, fearful things; indeed, the most horrible things existing in the sensory world cannot be compared with the dangers that surround us in the higher worlds. If we look into the higher spheres we experience worlds of bliss, but at the same time we must face in them fearful terrible things, which must be experienced calmly and courageously.

The real facts have not changed; only our feelings have changed. The facts themselves existed before we knew of them; only our knowledge of the facts has changed. And there, we must remain fearless and calm. Simple though it may seem, it is nevertheless difficult to carry it through. But if we do not succeed, fear and terror of the spiritual worlds will rise up in us.

This is not an indifferent thing - for they are real powers. In the spiritual world there are beings who gladly feed on the feelings of fear which we stream out. They suffer from consumption when they do not obtain this nourishment. They surround us

like vampires; if we nourish them with feelings of fear and terror, they suck their fill. There we must be steadfast; if we wish to enter those worlds, we must have completely lost every feeling of fear.

Other feelings, too, which we bring with us from the world of the senses must have been discarded long ago, for they are a disadvantage, a terrible obstacle in these worlds. Negative feelings of this kind are ambition, vanity, rage, hatred, anger, egoism. Feelings that do not mean much in ordinary life become real monsters in regard to their dangerous aspect. The human being who enters the higher worlds without having discarded such feelings, offers welcome nourishment to these beings. It is not necessary for him to see them; nevertheless they undermine his health, they ruin his nerves and disturb his sleep. This is all quite true!

(TO BE CONTINUED)

THE DEMONOLOGY OF THE 19TH CENTURY.

1. THE EXACT (CLASSICAL) NATURAL SCIENCES.

By Dr. W. S c h o r n s t e i n .

Facts relating to the history of civilisation are not causally inter-connected; that is to say, not every fact is the effect of another which is its cause. Historical facts can only be understood when regarded as symptoms of a hidden, coherent spiritual process. *)

This hidden spiritual process forms the subject of the spiritual-scientific investigation established by Rudolf Steiner.

The human being is interwoven with this process, both in life and death, through reincarnation. There is an evolution of consciousness during the seven metamorphic stages which constitute the seven epochs of culture. In the first four epochs (the ancient Indian, the ancient Persian, the Egyptian-Chaldean and the Graeco-Latin epochs) the Gods themselves teach man in a direct and indirect way to use his four soul-capacities, his senses, his limbs, his feeling and his thought. (Religio) The fourth epoch of culture, the Graeco-Roman one, which began about the year 800 B.C., unfolds the intellectual and contemplative powers in the understanding soul. This epoch ends at the beginning of the 15th century. The fifth epoch of culture, in which we are now living, takes over from the preceding one the fully developed intellect, with its given conceptual contents. At first, it is unable to form any new concepts; indeed, along the old lines (passive thinking) this is quite impossible. It therefore turns to sense-perception and applies the old concepts to a new object,

See "HISTORICAL NECESSITY AND FREEDOM". 7 Lectures by Rudolf Steiner publ. in German by the Phil. Anthropol. Publ. Co. in Dornach, Switzerland

namely, to external Nature. (The natural-scientific age.) The individual human being thus becomes conscious of his own self (Ego-consciousness), but he forgets his spiritual origin and looks for a physical one.

The more the divine educators of the human race withdraw, the more do the spiritual tempters interfere with the course of man's development

But the rightful Gods counter-act, and through the Mystery of Golgotha they bring a new impulse into the development of cultural life. There is no constraint in this new impulse. For constraint, or coercion, would not be appropriate to a man who has awakened to the realisation of his own Ego. The Christ Impulse leaves man free. It does not affect consciousness, as long as it remains passive, so that we must become spiritually active in order to establish a connection with the Christ Impulse.

Where this connection is wanting, humanity sinks into inner and outer catastrophes.

Demoniacal influences approach man, whenever he is inactive or semi-conscious. They strive to usurp the guidance of mankind. And man, who is still accustomed to be led, is consequently inclined to submit to any guidance, even to a mistaken guidance.

The true essence of these demon-influences and their mode of procedure can be studied symptomatically in the development of natural science and technics.

Rudolf Steiner designates these demons that penetrate (not for the first time!) into the earth between 1841 and 1879, as the inspiring forces (genii) of natural science and technics. We should therefore investigate the changes which took place in natural science before, during and after that interval. It is a well known fact that discoveries, inventions and hypotheses abounded during the 60 years running from 1840 to the end of the century. At the beginning of the 20th century, all fundamental principles constituting modern natural science were already available, and for the greater part they had already been worked out, while the rest existed in a rudimentary form (Except the Theory of Relativity and the phenomena known as breaking up of atoms by "bombardment". Sir J.J. Thomson) The discoveries made from 1879 onwards do not, however, influence the expiring century of classical physics and chemistry. They are seeds which spring up during the 20th century, which is characterised by demonstrating the reality of the atomic theory. (Atomic physics.) But this coincidence with a hidden spiritual process does not in itself provide us with a real insight.

We may proceed by asking the following questions:

1. What new contents does scientific research envisage after 1840, and what old contents does it lose out of sight ?

- 2 What changes are there in the mode of investigation, that is to say, what new thoughts and experimental methods are applied in scientific research, and what old methods are abandoned ?

In other words : What subjects are studied and handled by preference, and WHAT arouses the interest and attention of natural-scientific research in the field of visible things ? What directions of thought and concepts are preferred, and what others are neglected ?

The human being rarely follows the dictates of thought in his actions, but is far more frequently guided by his sub-conscious likes or dislikes. Even in natural-scientific research, the choice of the object to be investigated and the choice of the conceptual forms to be adopted are determined by sympathy and antipathy. Also a "casual" course of external events (chance) may give rise to human actions. What the eye happens to encounter, is often the point of departure in modern science.

When we face the above questions, we find that a decisive change took place around 1840. Let us first characterise this more generally.

We will bear in mind, to begin with, that around 1840 natural science, which already possessed a materialistic colouring and had up to that time always been restricted to men of learning, began to fascinate the general public, supplanting art, religion, and philosophy, which began to lose their former value. The gulf between the natural and the moral world deepened. Natural science was cut off from its traditions (it used to be an integral part of philosophy.*). Let us mention just one example; in 1873 we find that Lavoisier dictatorially discarded in the field of chemistry nearly all the existing alchemistic concepts, and rechristened the others. He arbitrarily created a new nomenclature, just as the French Revolution, in whose stream he drifted and to which he finally succumbed, had called into life a new calendar.

Natural science is based on (sense) experience, which can be demonstrated and reproduced with the aid of exact experiments.

Philosophy, religion and spiritual science in general no longer hold that they can really experience what they investigate; they think instead that they must rely upon the experience of past cultures. (Traditional revelation) They even begin to doubt whether revelation was ever based upon reality and whether this reality

*) At the time of Newton (1642-1727) natural science was called philosophy. The scientists believed in innate knowledge and deduced the structure of the external world from "a priori" principles. (Hypotheses). Newton, on the other hand, startled them by simply stating observed facts, from which he induced generalisations. (J. Newton by J.W.N. Sullivan, London 1938. pages 32, 128)

though it cannot be experienced, exists at all. (The law stating that the pressure and volume of gases of equal temperature are inversely related to one another, can always be checked in the laboratory, for gas is a reality subject to experiments. But the sentence, "God is Love", cannot be proved, for to-day God's existence cannot apparently be experienced in an exact way, neither can the existence of love be experienced in an exact way. (At least, not yet.)

Natural science alone, it would seem, can provide science with a real foundation, by restricting itself to the experience derived through the senses. Thus only the subjects investigated by natural science can really be experienced - that is to say, experienced in an exact way.

Success seems to justify this restriction to a reality which can be experienced and measured. By proceeding from the natural-scientific picture of the world, which is still a hypothetical one subjected to constant amendments and corrections through experimental research, supreme control can be obtained over matter and force, with the aid of technical experiments. It is bewildering to see how the success even exceeded every expectation.

The authority (predominance) of natural science begins to assert itself around 1840, by a monopoly of reality on the basis of experience, and supported by the success reaped in the technical sphere.

Theology, philosophy, history, psychology, etc. consequently seek to adopt the natural-scientific method: but instead of adapting the method of perception so that it can be applied to spiritual realities, they limit themselves to a sensory world accredited by physics.

Philosophy thus loses all its contents; it becomes a purely formal science. Religion and history restrict themselves to the study of documents and interpret historical events causally. We therefore have before us the grotesque spectacle of spiritual sciences which banish from their sphere the true essence of their subject, i.e. the spirit, by stating that no scientific reality can be ascribed to it. A Christology excluding the Christ thus arises. (David Friedrich Strauss, 1808-1872; Bruno Bauer, 1809-1882; J.E. Renan, 1823-1892.)

Karl Marx establishes the materialistic conception of history, according to which historical events are determined by economic forces, and culture, a by-product of economic life, is simply an ideological (that is to say, unreal) disguise of reality. (Communist Manifesto of 1848.)

In 1861, Spencer claims (Liebig already claimed it in 1842) a scientific education, instead of a humanistic one.

The exact methods of natural science transferred to other fields fail whenever they are adopted superficially, in a purely external way, instead of being transformed in conformity with the laws of the subjects to which they are applied.

Rudolf Steiner alone was able to conform scientific methods to spheres transcending the physical. The first attempts in this direction, which were made by Goethe and the German idealists, vanished with their deaths. (Before 1840)

Only a few men of the succeeding generations endeavoured to maintain that spirit. Their work continues as a thin under-current, which would have sunk into oblivion had Rudolf Steiner not raised it systematically to the surface. *)

Goethe's natural-scientific work met with the same fate, although it was to him far more important than everything else he did. The observation of the physical phenomenon (Colour-Theory), until it could be led back to its pure form of manifestation (the archetypal phenomenon), the contemplation of the forms pertaining to the living kingdoms of Nature (the "morphe", i.e. "form" in Greek), and the enhanced power of vision in the contemplation of metamorphosis (the spiritual formative principle transcending the physical form) - all this was lost, both as experienced contents and as method, until it was re-established and developed by Rudolf Steiner. **)

Under the guidance of physics and chemistry, the investigation of Nature loses sight altogether of the "image of Nature" (the forms and formative forces in the kingdoms of Nature: plants, animals, including man.) Its attention is directed towards the amorphous entities, i.e. to the riddles of matter and force. **) The search for new (blind) forces (dynamism) and (lifeless) matter predominates. (The fundamental chemical elements.)

Important discoveries (electricity, magnetism, various radiations) were already made, unsought-for, as early as the 18th century, but they remained isolated and unnoticed. This situation completely changes around 1840. Only then does the dynamic direction begin, pursuing a definite aim. This aim is a definite one, not because the individual human being is already able to formulate it, but because a dominating intelligent power, manifesting itself in single coordinated efforts, seems to lead scientific research in ever narrowing spirals around one centre (the electron), and towards the end of the century it was, so to speak, swallowed up by this central and final point.

*) See Rudolf Steiner's "RIDDLES OF MAN"

**) "FUNDAMENTALS OF A THEORY OF KNOWLEDGE CONSTITUTING GOETHE'S CONCEPTION OF THE WORLD" (1886) and "INTRODUCTION TO GOETHE'S NATURAL-SCIENTIFIC WRITINGS" (Kürschner Edition). By R. Steiner.

***) See Büchner's "MATTER AND FORCE", 1855.

Let us bear in mind the following: Not the forms of Nature (the image of Nature), but only matter and force as such now interest man. Experimental research, however, cuts matter and force off from their true connection with Nature. Scientists do not investigate how NATURE deals with matter and force, but they investigate what results can be obtained in the laboratory, how the substances behave in the closed "apparative system", under conditions (liquid air, molten quartz, gaseous metal) which exist nowhere in the accessible spheres of Nature (upon the surface of the earth). And the results thus obtained are supposed to constitute the laws and norms of "Nature" (the constant factors of Nature) discovered in laboratories, valid always (eternally) and everywhere (throughout the world). (Unjustified extrapolation)

The field of experience is thus extended far beyond directly observable processes of Nature, while at the same time the exact scientific research more and more neglects to study the free processes of Nature, for these are, to begin with, not accessible to the "exact" experimental method. An artificial sensory world (experimental techniques) is thus added to the natural world, and this artificial world is the subject of classical physics and chemistry.

This change in the objective field of scientific research leads us on to the study of the change which took place in the mode of thinking.

II.

Electricity and Its Entrance into Civilisation.

Ever since the 15th century, the endeavour has been made to define processes of Nature mathematically and quantitatively (according to measure and weight), to grasp them arithmetically (by number), and to imagine them geometrically (according to their position in space). But only in 1809, Dalton's application of the Atomic Theory opens out the possibility of an arithmetical formulation in the field of chemistry. (Chemical formulae and equations) From 1840 onwards, atomism *) began to rule the scientific world. Gases liquids and the solid inside of crystals or glass (the "continua" of the three ponderable elements) are continuous (amorphous) as far as the eye (and also the microscope) are concerned. They are optically void. This is a fundamental experience (animate chaos): it is the opposite pole of the (relatively inanimate) world of objects (form) (kingdoms of Nature), of the formed, limited and spatially individualised things. Modern atomism has developed the fiction that the "continua" consist of imperceptibly (sub-perceptibly) small particles (things) in empty space, thus doing away with the "continua" altogether.

*) Atomism, a "revenant" of the entirely different Greek atomistic (500 B.C.), has been, ever since the 15th century, a hypothetic spook, competing with the Theory of Waves and Vortexes in the Ether. Nicolas Gusanus (1401-1464) already took it into consideration.

(Kinetic Theory of Gases, founded independently from one another by Clausius and W. Thomson in 1851. Dissociation of Solutions, 1857. Theory of Gases applied to Solutions, 1878.) These atomistic fictions have a way of creeping into the consciousness of the century, where they gradually assume the character of facts. The mathematical formulae first adopted as a means of interpretation, are soon taken to embody a more deeply founded (more objective) reality than the one supplied by sense perception.

The craving to attribute structure to unstructured matter (the continuous element), does not limit itself to this; it takes hold of the world of forces. *) But the pure hypothesis became tangible, only when the transformation of mechanical energy into heat could be checked by mensuration,

In 1840 (published in 1842) J.R. Mayer "discovered" the "equivalent" of heat and energy, but only in the form of thought experiment, and not based on physical tests. Joule and Helmholtz (independently from one another and from Mayer) started from the same notion but corroborated it experimentally in 1847. Mechanical work (lifted weight) can be measured. (Weight multiplied by vertical lift). This product is taken to be equivalent to the product arrived at by multiplying the weight of mechanically heated water (friction) with the difference of temperature (degrees) before and after the experiment (Calories). The constancy of this proportion can be proved, and it led the discoverers to the idea of transformation of mechanical energy into heat without loss, and consequently Helmholtz pronounced the idea of the indestructibility of energy, in addition to the already accepted law of the persistence of matter.

The quantitative subdivision of every kind of energy - for instance, light, or chemical and electric energy - by comparing it with one of the two units of measure (HP or calories), is possible if the energy to be measured can be transformed into heat or into mechanical energy, or if it can be obtained from them.

Now it is strange to see that the most suitable energy for such a transformation is Electricity. Its transformation into and generation from chemical energy (Electrolysis 1789; Galvanic elements 1836/42), its generation from heat (Thermo-column 1801), its relation to magnetism (1820) and the electro-magnetic generation of power (1820), were well-known facts. Also the generation of heat and cold by electric currents. Their power and tension could moreover be measured with great exactness.

Electricity (and its unit of energy, the kilowatt hour) thus became, as it were, the common denominator of all the other forms of energy, and at the same time it became, experimentally, the way by which they can be approached, for the other energies became quantitatively comparable by generating them out of electricity, or by transforming them into it.

*) This tendency can, in a modern sense, be ascertained already in the 15th century.

... light, chemical forces and life are, according to Rudolf Steiner, "etheric formative forces". (Among other activities, they give form and structure to the Beings of Nature.) They are in themselves SUPER-SENSIBLE. Gravity, electricity, magnetism and other radiations akin to these are, on the other hand, SUB-SENSIBLE. The material substance (mineral substances, water, air and earth) is the mediator between them. Both categories, the super-sensible and the sub-sensible energies, require the presence of matter in order to become manifest in their effects.

Gravity (weight) and electricity are particularly accessible to mensuration, whereas this is not the case with the first-mentioned energies, for the "higher" the forms of energy, the less are they accessible to mensuration. Electricity and weight can be defined precisely and subdivided into minimal "portions". Mensuration by weight and electricity are among the surest and most sensitive quantitative methods. The mensuration and subdivision of heat (Calorimetry), light (Photometry) and of chemical energies present, on the other hand, great difficulties, are not always reliable and in part only possible through the medium of electric mensuration and weighing.

In the sensory sphere, we come across some processes in which one or more etheric formative forces are NOT involved. Life-ether plays no part whatever in most anorganic processes. (Except in the processes of crystallization and dissolution.) Every purely physical process is on the other hand not influenced by the chemical ether. (Except the acoustic phenomena.) There are many processes which neither produce nor consume light. Weight (volume) enters every process involving ponderable elements. But there are processes which are independent of weight. (Optics *) On the other hand, ALL earthly processes seem to be accompanied by changes of temperature AND by electro-magnetic phenomena. The circle may be extended ad lib. It also includes the growth of plants, muscular work, sense-perception, feelings (anger, love, hatred) (Electro-cardiogram). Electric mensuration can even ascertain whether a person is thinking or dozing, though this fact may be repugnant to many.

We therefore see that every physical phenomenon is accompanied by a constant twofold process: By a super-sensible one (heat) and a sub-sensible one. (electricity) (Basso ostinato.)

In Rudolf Steiner's cosmology **), heat (in two forms, as inner warmth of the soul and as external heat) is the foundation of development FROM THE VERY OUTSET, long BEFORE the appearance of the earth and its human inhabitants. Weight and electricity, on the other hand, only arose in the course of development of the already mineralised earth. (In the Lemurian age. ***)

*) The author is acquainted with the experimental effects named after H.A. Compton and with the photo-electric influences. **) "OCCULT SCIENCE", Chapt on the Evolution of the World and of Man. ***) Lect. of the 2nd of Oct. 1916, publ. in "KOSMISCHE U. MENSCHLICHE GESCHICHTE" Vol. 4: Goethe and the Crisis of the 19th Century.

According to other lectures, the sub-material principles constitute Ahriman's kingdom, reaching as far up as the solid, lifeless crystals. The lectures of the 18th, 19th and 25th of November 1917 speak of an Ahrimanic double-ganger of man, related to the magnetic forces of the earth and to its electric processes. *)

Only after 1840 natural science and technics become familiar with electricity. Electricity begins to "permeate culture", "it impresses its Karma upon the age, from outside" (Rudolf Steiner). We may speak of electricity as of something which is representative for the new content of natural science during the 60 years from 1840 to 1900.

The train of thought of natural science may be characterised as atomistic, calculative, mechanistic and quantitative.

The content of scientific research (electricity) and its train of thought are in tune with one another. But at the end of the century the strange thing occurs that they not only harmonize, but they become identical, they coincide. Electricity supplies a fact already employed as a hypothesis, namely the atom - the ELECTRIC atom, not the material one. (Elementary quantum)

At this point it is necessary to bear in mind the sequence of events:

1. 1809: Dalton's Atomic Theory relating to Matter.
2. 1840/42: J.R.Mayer. 1847: Helmholtz, Joule, The Mensuration and Transformation of Energies and their subdivision into arbitrary units. (PS and calories.)
3. 1851: R.Clausius and W.Thomson: Kinetic THEORY of Gases (The concept of corpuscles.)
4. 1864: Clausius: Mechanic THEORY of Heat (Atomistic). "Heat is Movement", already expressed by J.R.Mayer in 1842. **)
5. 1869: Hittorf: Discovery of the Cathodic Rays (Electron rays), but without recognising their true (atomistic) nature.
6. 1877: Van t'Hoff: The first three-dimensional model of a molecule.
7. 1881: Stoney and Helmholtz: Electronic Theory. Hypothesis of an elementary quantum of electricity as a point of departure for calculations.

Thus we already have electrons in the form of radiations as phenomenon (5), but we do not as yet know their true nature. On the other hand, electrons have been formulated in thought (7) and exact calculations can be made with them. We do not however know that they really do exist

*) Rudolf Steiner: "IAS GEHEIMNIS DES DOPPELGAENGERS". Geographische Medizin. 15th & 16th of Nov. 1917.

**) R. Boyle and F. Bacon (17th cent.) already mention this hypothesis. But until 1840 a substantial (etheric) conception of heat prevailed.

the milestones along this road are:

8. 1888: A. Righi. 1889: Elster and Geitel: "Transformation" of light into electricity in the photo-electric cell. (Potassium cell)
9. 1897: Townsend discovers in the photo-electric effect (8) that electricity appears as a quantum, so that it is in fact ATOMARY.

Hypotheses and experiments abound in those decades, they chase, surpass and cross one another (5,7,8), until they finally merge in a last stage (9).

To the great surprise of theoreticians, the fictitious unit first called in as a mathematical aid is now confirmed to be really extant in the external world. This would be just as impossible as hearing that a real meridian had been unearthed at Greenwich while ploughing a field, at the very spot marked on the map!

An outsider cannot easily have a sufficiently vivid picture of the shock produced by this discovery on the scientific consciousness.

A real atom had actually been discovered - not the material one, but only that of negative electricity. Nevertheless this induced people to suspect that EVERY energy might consist of such small particles, and that even the atoms of matter were not mere fiction. The elementary quantum (9) of light (Photon) had already been measured, and its real existence was later on "proved". (In 1921, independently of 9)

If the above suspicion were true, the physical world-conception based upon it would reduce the sensory world to but a few different ingredients (elementary electric corpuscles), which behave in a way that can be described in a pure theory of motion and mechanics (Quantum Theory, Planck 1900)

However, electricity in one or the other form is indispensable for the experiments made in order to determine the nature of matter or force. The world is being tested, so to speak, with an electric sounding rod. And a material surface is just as indispensable, in order to arrive at phenomena which can be recorded. Corpuscular phenomena have only been ascertained where energy leaves or enters matter *)

This method of investigation, as will be shown, does not leave any other possibility to its object than a reaction in terms of electricity, if it does react at all..

*) The simultaneous wave-nature of the electron will be dealt with separately, as also the crisis of logic involved by the polarity "wave and corpuscle".

(THE THIRD ARTICLE OF THIS SERIES WILL APPEAR IN THE NEXT NUMBER)

DORNACH NEWS.

On the 17th and 18th of May there will be a Weekend-Conference on Bio-Dynamic Agriculture, and on Saturday 5 p.m. the General Meeting of the Bio-Dynamic Ring.